Forest Insect & Disease Management

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BIOLOGICAL EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS ON THE CROATAN NATIONAL FOREST, NORTH CAROLINA

by

William H. Hoffard and Hoover L. Lambert

ABSTRACT

An aerial survey and ground checks of 308,226 acres including 47,000 acres of host type, showed 76 southern pine beetle spots (1.62 spots/1000 acres host) containing an estimated 163 MBF of infested timber. Forest Pest Management recommends that a control project be started in FY 1981.

INTRODUCTION

Historically, southern pine beetle activity on the Croatan National Forest has been low. Biological evaluations from the sixties showed very few infestations (Ciesla and others, 1965; Bell and others, 1965; Bell and Bassett, 1968; Barry and others, 1969; Flavell and Bassett, 1969) until 1969 which saw a slight flurry of activity (Rauschenberger and McDowell, 1969) which quickly subsided. Forest Insect and Disease Management records for the 1970's showed little activity until 1979 (Barry and Hoffard, 1979) when a number of widely dispersed spots were reported. These spots eventually proliferated until the current outbreak was realized.

SOUTHEASTERN AREA, STATE & PRIVATE FORESTRY
USDA FOREST SERVICE, ATLANTA, GA 30309

METHODS

On July 14, the Aerial Survey Team of Forest Pest Management performed a 100% aerial sketch map survey of the Croatan National Forest (Wilson and Landgraf, 1980). Areas of dead and dying pine were marked on a Class "A" Forest Service map which was then forwarded to the Asheville Field Office for use in ground checking during the week of July 22.

In the ground check phase of the survey, 11 spots were randomly selected proportionate to spot size class distribution (1-10, 11-25, 26-50, 51-100, and 100+). Each spot was visited and examined to determine cause of mortality. Southern pine beetle infested trees were measured to determine volume, and red to green infested trees ratios were taken to project total volumes based on aerial survey data. Additionally, age and basal area were measured.

RESULTS

Table 1 shows results of the expanded aerial survey data. The data show 1.62 spots per 1000 acres of host type. Southern pine beetle activity is dispersed throughout the Croatan National Forest (figure 1).

An estimated 163 MBF of timber are currently infested. Based on spot proliferation data gathered under similar outbreak conditions in South Carolina, this represents an eventual possible loss of 815 MBF if spots are not controlled.

Table 1.--Spot size class distribution after expansion of aerial survey data. Croatan National Forest, 1980.

	- - - - Spot Size Category - - - -					
	1-10	11-25	26-50	51-100	100+	Total
No. spots	30	12	7	15	12	76
No. trees	905	372	208	464	373	2322

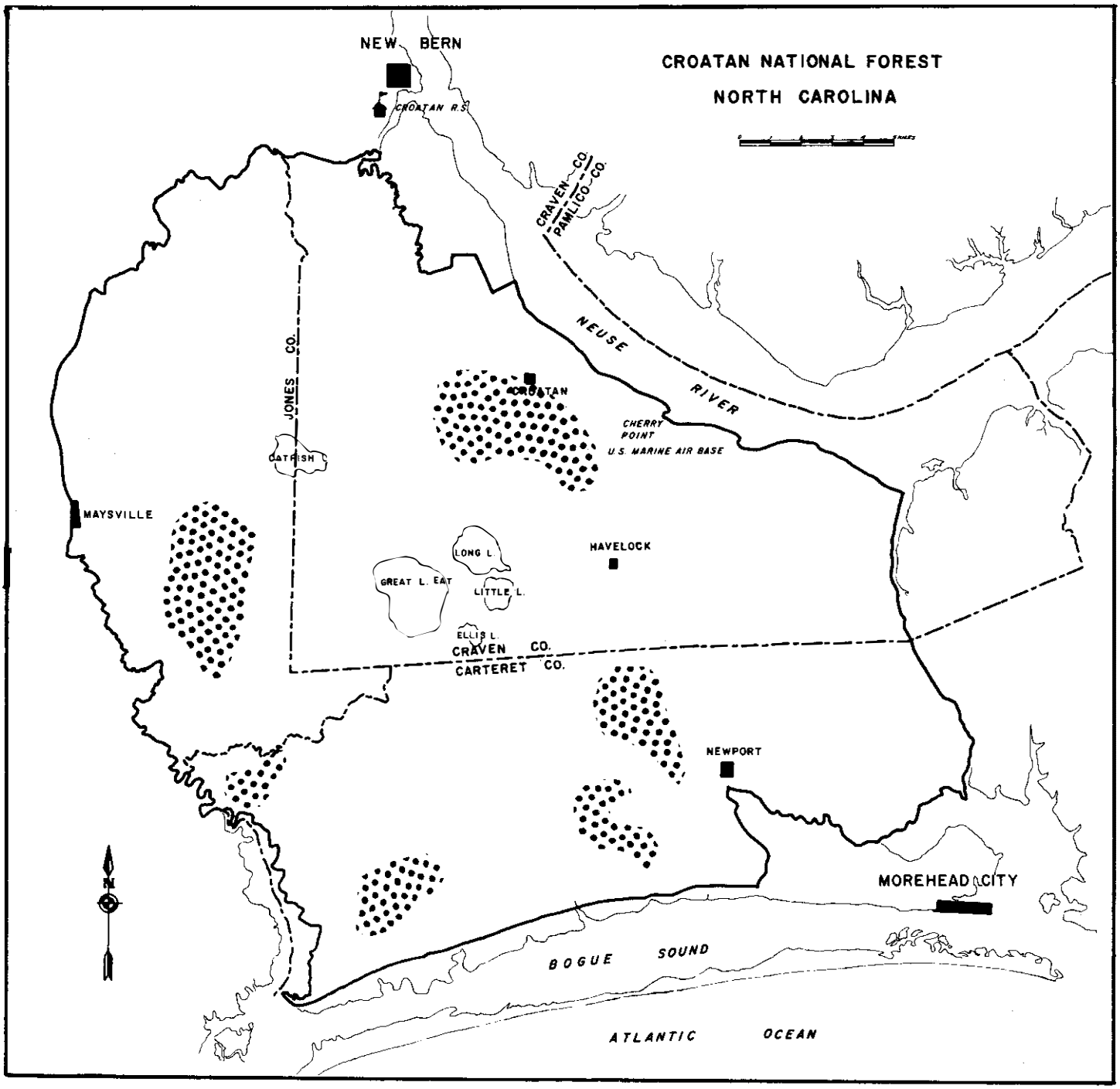

Figure 1. Shaded sections show areas of heaviest SPB activity.

RECOMMENDATIONS

A southern pine beetle control project should be started on the Croatan National Forest. A number of direct and indirect suppression strategies can be used.

CURRENT DIRECT SUPPRESSION RECOMMENDATIONS

1. Removal of Infested Trees by Commercial Sale or Administrative Use. When infested trees of merchantable size are accessible, they should be removed by commercial sale or administrative use procedures. Logging of the infested material should begin immediately. Contract time limits should insure rapid removal.

   When practical, and if host type and fresh attacks are present, a 40- to 70-foot buffer strip should be marked and cut adjacent to and ahead of the most recently infested trees. This practice is effective in reducing the possibility of "breakouts." When only a small volume of infested merchantable material occurs in a spot, noninfested trees surrounding the spot may be marked to provide an operable cut.

   The order of priority of removing beetle-infested timber from a spot with fresh attacks should be as follows:

   -- Trees in the buffer zone at the head(s) of the spot - if not removed within 2 weeks of marking, another visit and talley must be made in order to insure removal of all infested trees and an adequate buffer strip.

   -- Trees with fresh attacks and having young brood (usually the green, recently infested trees).

   -- Trees having nearly developed brood (usually the red and fading trees).

   -- Older, nonsalvagable vacated material should be left to let parasites and predators emerge and provide foraging and potential nest trees for some woodpecker species.

   Remove infested trees from National Forest lands by commercial sale or administrative procedures in accordance with guidelines and procedures set forth in FSM 2400 through 2490.

2. Piling and Burning. Unmerchantable or inaccessible southern pine beetle infestations can be suppressed by cutting, piling, and thoroughly burning the bark of infested trees. The entire bark surface must be thoroughly burned to insure effective control. The side order of priority for cutting, piling, and burning infested trees, particularly the large spots, is the same as paragraph (1) under "Removal of Infested Trees by Commercial Sale or Administrative Use." Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts," every effort should be made to locate and treat all green infested trees during the piling and burning operation.

3. Chemical Control. The chemical formulation recommended for southern pine beetle control is a ½ percent lindane spray with water as the carrier. This may be formulated from a 20 percent lindane emulsifiable concentrate at the rate of 11 pints of concentrate in enough water to make 55 gallons of spray. (Ratio of one part 20 percent lindane EC to 39 parts water.)

   Dursban® (chlorpyrifos) is also registered for southern pine beetle control. It is available as a liquid containing 4 pounds of insecticide per gallon of concentrate. The spray is prepared by mixing 2 2/3 fluid ounces of concentrate with water to make 1 gallon or 2.1 gallons of concentrate in 100 gallons of water. Dursban® is to be applied only by or under the supervision of a certified pest control operator or other trained personnel responsible for insect control programs.

   Cut, limb, and buck all infested trees into workable lengths. Spray the infested bark surface to the point of runoff. A compressed air sprayer (3-gallon capacity or equivalent) is an ideal applicator. Infested logs must be turned two or three times to insure complete treatment of infested bark. Low pressure sprayers may be used to treat large accessible infestations.

   The order of priority for cutting and spraying infested trees in large spots is the same as paragraph (1) under "Removal of Infested Trees by Commercial Sale or Administrative Use." Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts," every effort should be made to locate and treat all green infested trees during the chemical control operation.

   Never spray trees from which southern pine beetle brood has emerged. Natural enemies of the southern pine beetle in these trees can then complete their development.

   Instructions for minimizing the adverse effects of mixing, transporting and storing pesticides, applying pesticides and disposing of pesticide containers and excess chemicals are outlined in Section 8.3 of the Forest Service Health and Safety Code FSM 5242.21.

4. Cut-and-leave. This control tactic reduced losses from spot growth and proliferation during the summer months. Cut-and-leave is designed to disrupt spot growth in small to medium-sized spots (10-40 active trees) by dispersing emerging beetles. These spots can be salvaged when markets or weather permit. Trees are still suitable for sale months after felling.

The following procedure is to be followed when using cut-and-leave:

(1) Identify all active trees within the spot.

(2) Fell all trees toward the center of the spot.

(3) Fell a horse-shoe-shaped buffer of green, uninfested trees around the most recently attacked trees at the head of the spot and leave them lying on the ground with crowns pointed toward the center of the spot. The buffer should be as wide as the average height of the trees in the stand.

Cut-and-leave treatments should only be applied during the summer months between June and October. Spots with 10 or more infested trees should be treated first. As time permits, spots with less than 10 infested trees should also be treated if they contain trees with fresh attacks. In these smaller infestations where a specific head is not distinguishable, an adequate buffer strip (equivalent to the average height of the stand) and all infested and green uninfested trees within the spot should be felled.

SETTING SPOT TREATMENT PRIORITIES

Based on spot viability, stand stress factors, and economics, Billings and Pase (1979) developed a simple system for assigning spot treatment priorities. The system is summarized in the following table. Stage I trees are freshly attacked. Stage II trees are ones containing developing southern pine beetle brood.

Table 2.--Guide to southern pine beetle spot growth and control priorities (May through October)

Key to spot growth	Spot classification	Risk-rating points
A. Stage 1 trees	absent	0
	present	30
B. Stage 1 and 2 trees	1-10	0
	11-20	10
	21-50	20
	more than 50	40
C. Pine basal area (ft^2/Ac) (or stand density) at active head or heads	less than 80 (low density)	0
	80-120 (medium density)	10
	more than 120 (high density)	20

D.	Stand class by average d.b.h. (in inches)	pulpwood (9 in or less)	0
		sawtimber (more than 9 in)	10
		Total[1]	

[1]If total is 70-100 control priority is High. If total is 40-60 control priority is Medium. If total is 0-30 control priority is Low.

Reexamination of Treated Areas. Reexamine areas where infested trees were removed by commercial sales, piled and burned, or chemically treated or cut and left within 2 or 3 weeks after treatment to check for additional infested trees. If additional trees are found, and if priorities permit, treat them (see "Setting Spot Treatment Priorities.")

In any area where infested trees are cut for chemical control, piling and burning, cut-and-leave or removed through commercial sales and administrative use procedures, stumps adjacent to living pine trees should be treated to control or prevent the root rot Fomes annosus (a disease which can aggravate southern pine beetle problems).

Stands that have been previously thinned or have had a history of F. annosus infection, stumps should be treated with the competing fungus, Peniophora gigantea.

Stands that have no history of F. annosus and have never been thinned the stumps should be treated with borax.

Southern pine beetle infested tree stumps cut during the period of May through August, and below 34° N. latitude do not have to be treated with either of the above materials. This is because few spores are formed during this period and high temperatures often kill spores that are produced. However, routine summer thinning in areas of southern pine beetle buildup is not recommended.

PREVENTIVE MEASURES

The preceeding represents only short-term, immediate control strategies. Preventive measures must be taken to help ward off further southern pine beetle infestations in noninfested stands. Some of the more significant preventive measures include:

1. Preventing or minimizing littleleaf disease, a condition associated with beetle attack. Research has shown a relationship between southern

pine beetle infestations and areas designated as "littleleaf sites." Depending on severity of infection, diseased trees may be removed during normal thinnings, on a 6-year cutting cycle or as soon as merchantable. In high-hazard areas or in replanting known littleleaf sites, use loblolly pine or a more resistant tree species, as opposed to shortleaf pine.

2. Harvesting mature and overmature stands. Such stands are vulnerable to beetle attack and should be harvested as soon as possible.

3. Thinning stagnated stands. Overstocked stands are low in vigor and are more likely to be attacked. They should be thinned to a point that trees again show thrift and vigor.

4. Minimizing impact of natural disturbances which causes stand stress. These factors include ice, wind, hail, and animal damage, flooding, erosion, poor soil fertility, lightning, etc. Corrective measures include removal of individually damaged trees, wholesale salvage, improving drainage, fertilization, etc.

5. Minimizing or eliminating man-caused disturbances. Logging, pipeline, sewerline, and powerline construction, and other construction activities require use of heavy equipment which causes tree skinning and soil compaction and significantly weakens trees. Efforts to minimize the damaging consequences of these activities can significantly reduce the possibility of their leading to southern pine beetle problems.

PRECAUTIONARY PESTICIDE USE STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key--out of reach of children and animals--away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the

eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you used for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary landfill dump, or crush and bury them in a level isolated place.

NOTE: Some states have restrictions on the use of certain pesticides. Check your state and local regulations. Also, because registration of pesticides are under constant review by the U. S. Department of Agriculture, consult your county agricultural agent or state extension specialist to be sure the intended use is still registered.

RED COCKADED WOODPECKER CONSIDERATIONS

1. Within colonies and buffer zones, each infested tree will be inspected individually and decisions made as to control measures for that tree; buffers of noninfested trees will not be treated.

2. Active cavity trees will not be cut or sprayed.

3. Dead or apparently live cavity trees from which beetles have emerged will not be cut.

4. Inactive cavities (dead, enlarged by other species, etc.) will not be cut unless a minimum of four cavity trees (active and inactive) per colony remain to provide shelter for a breeding pair of birds and up to two helpers for the interim period necessary for excavation of new replacement cavities.

5. Spraying with presently approved pesticides (Lindane - a chlorinated hydrocarbon, Dursban - an organophosphate) will not be conducted within colonies and buffers--trees cut within these areas will be removed.

6. Cutting of buffers around the head of infestations in contiguous habitat is acceptable unless doing so would separate the colony completely from suitable foraging territory (doughnutting or isolating colonies). In this case, the Croatan NF Wildlife Manager should determine if a buffer should be cut and, if so, the modifications of the buffer that should be made considering:

    a. the likelihood of preventing the infestation from entering colony sites by cutting or not cutting the buffer,

    b. the distance from the colony to suitable foraging territory if a buffer is cut (short distances would be crossed by the bird without undue impact), and

    c. the probability of the infestation destroying all or a significant portion of the foraging territory if the buffer is cut versus not cut.

These guidelines were developed by the U. S. Fish and Wildlife Service, Asheville, N.C. and Forest Insect and Disease Management, Asheville, N.C.

LITERATURE CITED

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ADDENDUM TO REPORT NO. 80-1-23

There has been some confusion over interpretation of table 1 in Report No. 80-1-23, "Biological Evaluation of Southern Pine Beetle Infestations on the Croatan National Forest, North Carolina."

As shown in the original table, "Spot size category" refers to a classification based on the number of red trees as reported on the aerial survey. Subsequent ground sampling within each of these categories showed that only some or none of these red-topped trees were infested, whereas some or many additional green trees (not detectable from the air) may have been infested. When projected for all spots in each size class category, the number of trees then superficially seems far out of line with the parameter of the size class category.

Essentially, there is a shifting of numbers of spots within each spot size category which is realized only after the ground check (which modifies numbers of trees within each spot).

The following table shows the literal distribution after the data shift within each category.

	- - - - Spot size category - - - -					
	1-10	11-25	26-50	51-100	100+	Total
No. spots	16	19	24	13	4	76
No. infested trees	62	310	687	818	445	2,322

Future evaluations will show only this latter type of distribution.